Karo-Echo EmComm Training Goals

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Section I: The Four Progressive Levels of EmComm Operator Efficiency

Karo-Echo training will pertain to the various skills needed in field operations by EmComm Operators as detailed in the Karo-Echo EmComm Field Operations Handbook; which are designed to best serve the auxiliary disaster communications needs of our Community and Nation.

Training can be accomplished through discussion, classes, table top drills, on the air practice, community public events, participation in drills/tests in the field simulating disaster conditions, where the assumption that conventional power grid and communications channels are unavailable.

The training will apply to four levels of skill, that are progressive.

1) EmComm Radio Operator level **A** (skilled in 2M and 440 MHz FM use, spare batteries, and simplex/repeater portable operation)
2) EmComm Radio Operator **Advanced B** level is skilled in A as above; but additionally has portable external antenna capability, antenna and power adapters, expert message handling skills, net operations skills, and long term portable power capabilities (minimum of 8 hours).
3) EmComm Radio Operator **Extra C** A skill level who has all of the above skills, plus net control training, higher power portable operation capabilities (such as a 25 watt mobile/ portable with gel cell or better emergency power), some digital radio communications mode capabilities (APRS, MT63/2000L, Winlink, or similar), and leadership/people skills.
4) MAT Qualified EmComm Radio Operator qualified of a being part of a Mutual Aid Strike Team. An ideal strike team will have five members including a lead and an assistant lead operator. (See the Karo-Echo Field Operations Handbook MAT appendix)

1) EmComm Radio Operator Level, A is skilled in 2M and 440 MHz FM usage both repeater and simplex. He/she has spare batteries that can operate for a minimum of 8 hour assignments, can handle written messages efficiently, utilize the ITU phonetic alphabet, know how to use tactical callsigns, be able to change simplex frequencies, set PL tones and offsets for repeater usage, and interact efficiently in a controlled (directed) net situation. Level A operators should be qualified in sending and receiving IC-213 and ARRL written forms and be familiar with standard net protocols, procedures, and terminology.

2) EmComm Radio Operator Level, Advanced (Level B) is skilled in A as above; but additionally has portable external antenna capability, expert message handling skills, net control skills, and long term portable power capabilities (greater than 8 hours of emergency power). He/she can function efficiently as a NCS in a directed net and is skilled in setting up a message center. As an advanced level operator is able to set up a portable medium to high power VHF and/or UHF radio station (25 watts or more), with long term battery capabilities, an external gain antenna (mag mount, J pole, or collinear antennas with 50' of additional coaxial cable. An advanced level EmComm operator will have Anderson powerpole adapters, antenna/coax adapters, understand what information should not be transmitted by radio such as personal medical status and names of victims, etc. An Advanced Level EmComm operator should know how and when to send DWI (NTS) traffic.

3) EmComm Radio Operator (Extra C) A skill level who has all of the above skills, plus expert net control experience, higher power and sustainable portable power capabilities, has digital radio communications mode capabilities, strong personal people skills, leadership skills, capable of serving as an assistant emergency coordinator (See ARRL Emergency Communications Handbook), familiarity with the ICS, Red Cross, ARES, RACES, and served agency procedures.

4) MAT Qualified EmComm Radio Operator is qualified for active participation in a Mutual Aid Strike Team. One should possess all of the above skills and knowledge plus be capable of operating portable HF with long term emergency power and portable antennas. A **MAT Qualified EmComm operator** should know how to set up a resource net, a staging area, an intake/briefing area to screen and assign new EmComm volunteers, be capable of training and qualifying new recruits on the spot, establish demob and debriefing situations, establish a tactical net, an activation sequence, deploy assignees to their designated assignments, be capable of interface with GMRS/FRS/CB/MURS, be capable of staffing key personnel for 24/7 duty assignments (using three 8 hour shifts or two 12 hour shifts), establish logistics and tactical and DWI nets when appropriate, and have a fully equipped go-kit for a 72 hour (or more) MAT assignment ready to go within an hour's notice.

All EmComm operators should attempt to have at the minimum of a half tank of gas in their vehicles at all times, as commercial gas pumps require electricity; which may not be available during a disaster.

Please note that these four levels corresponds roughly to the KARO-ECHO Go-Kit based on assignment durations and type of assignment.

A more detailed topic oriented skill-set description and study guide is available below; yet there is no better learning method than on the air simulated emergency tests (SETs).

Topics and General Discussion Study Material

Section II

A. ICS MESSAGE FORMATS

B. ARES MESSAGING

C. MUTUAL AID TEAMS (MAT)

ARES Messaging

Introduction

An important skill for radio operators providing emergency communications is the ability to concurrently receive, send, and log messages so that information is readily accessible to the radio operator, the supporting team of radio operators, and members of the served agencies. Messaging has long been our primary activity as amateur operators. In an emergency condition, certain specialized types of messaging are needed to support the operational capabilities of our agency partners. For that reason, the types of messages that are sent and received by ARES volunteers, the forms, and the records that are used to record those activities are important and necessary for our success. There are three key NIMS documents that capture information and organize the work effort so that each member of the radio team can handle the flow of radio messages systematically.

Following is an outline of the documents and the workflow. It assumes that the messages are handled in an EOC/Incident Communications Center setting — which is the most challenging of the four scenarios below.

IIA.1 Message Scenarios and Methods

For amateur and served agency partners during an emergency or a declared disaster, moving pertinent and precise information from one point to another is of the utmost importance.

Typical scenarios for the operators handling the messages include:

⍰ Operators at an Emergency Operating Center (EOC) working with representatives of

responding agencies.
⍰ Operators supporting a large field operation, such as an evacuation shelter.
⍰ Operators supporting a small field operation, such as a neighborhood incident or mobile in a vehicle.
⍰ Operators located at home.

Messages can be handled in many ways. Here are a few:
⍰ By phone — cellular service or by landline.
⍰ By fax.
⍰ By Internet.
⍰ By local UHF/VHF voice transmission.
⍰ By HF voice or CW transmission — medium and long-range communications .
⍰ By digital communications — UHF/VHF, HF.
⍰ By satellite communications
⍰ By Runner
⍰ By Bicycler

Though many of these modes of communication and others not mentioned here may or may not be accessible or available, it is the job of the EmComm operator to move messages to specified parties on request by any combination of means available.

Message Center

Messages at a message center should be ideally run by a **message center facilitator** Whose job should ensure the FIFO (first in – first out) principle. Also messages that may be valuable to more than one person should be copied and relayed.

II.A.2 Messaging and Logging Documents

There are several types of messaging documents that have been developed around the country and the world that have been useful for certain emergency issues or operational capabilities. However, for the purposes of EmComm messaging and unit operations, we endorse the standard use of Incident Command System (ICS) forms for both exercise as well as operational use. The reason is that our served agency partners already use these documents as part of their standard protocol. If we are working with the same documentation as our partners in exercises as well as our own practice scenarios, it will be much easier to work our team members and agency partners in an actual incident.

During an emergency, the operators need to maintain good awareness of an evolving situation. The operators must have information about the incident ready for briefing team members at the local site as well as exchange messages in an accurate and timely fashion. After an hour of intense radio communications, operators can easily forget or be confused on the details of what happened and when. Accurate logging of information helps the operator maintain situational awareness by shifting the operator’s reliance from personal memory to transcribing information real-time onto log documents that can be reviewed by the operators and others. The operator or other team member can quickly scan through the logs to locate the time and key details of an event or message. The key documents are the ICS 214 Activity Log and the ICS 213 Message Form.

It is best to work in two operator teams if personnel allows. One operates the radio and the other logs.

Radio messages fall into two broad categories:

a. **Tactical or informal radio messages.** Tactical messages are unstructured messages originated by the radio operator and typically convey status, progress, or situational information. Examples are road closures or obstruction, current location of a vehicle responding to a situation, or a short message from a third party to be relayed to another person. For tactical messages, key elements of the message are implied and usually not stated such as time of the message, and the position of authority of the message originator and recipient These types of messages are used to facilitate many things. Here are some examples:
- Command communications
- Weather status
- Resource needs
- Logistics needs
- Search and rescue operations
- Damage assessment
- ARESMAT coordination
- Security

In short, it is inefficient and wasteful to write down all messages in a formal format. This is standard tactical message procedure. At other times written formal messages are required.

b. **Formal radio messages.** Formal messages are structured messages containing a prescribed sequence of key message elements. Radio operators expect the elements to be exchanged in a certain sequence and will receive and write the information onto message forms. The NIMS ICS 213 is the message form common to emergency management agencies. Each agency in turn may implement specialized message forms to report and exchange operational information important to that agency.

Section II.A.3 ICS 214 Activity Log

The radio team should maintain an ICS 214 Activity Log at their operator position. When an operator arrives at the EOC and is ready to start a shift, that information should be logged in the ICS 214 log. Similarly, when an operator ends their shift, that information is also logged in the ICS 214.

Major internal events, such as the start of the incident, start of the radio operations, or key changes in the readiness or capabilities of the radio team should be logged into the ICS 214. Major external events, such as a key milestone, improvement or worsening of the incident, and availability or loss of electrical power should also be logged.

The updates to the ICS 214 log tend to be occasional during the incident. Attaching the current copy to a clipboard will keep it readily locatable and accessible for the team.

The ICS 214 form's primary purpose is to capture the record of significant activity during an operational period other than message traffic. If there is no other recording form available, the ICS 214 Activity Log could serve as a means to capture the necessary information concerning the transmittal of point-to-point messaging. This form will list the supervisor as well as the operators of the communication group as assigned for that period and the pertinent information of the operation and will provide a chronological record, by time, of that period's activities.

Section II.A.1 ICS 213 General Message Form

The standard ICS Form ICS 213 has been used for a number of years for general messaging and is used to exchange most formal radio messages. This form is not restricted in the number of words that can be used in the message. The ICS 213 is described as a general message form. It serves both as a sending document as well as a response document. When used operationally for either exercises or actual emergencies, the document becomes part of the permanent record of the operation.

The ICS 213 can be used as a transmittal document for other pertinent documentation, such as:

- Health and Welfare information
- General supplies requests
- Transfer facilities statuses
- Shelters available
- Shelter capacities
- Road and other infrastructure statuses
- Hospital availability reports and patient capacities
- Personal injury status and transport reports, etc.

As messages are received, the radio operator:

- Logs the incoming message activity in the ICS-214 activity log.
- Writes the incoming message activity onto the top half of the ICS 213 form.
- Records the communications event information in the bottom margin of the ICS 213 form.

⍰ Retains a copy of the message at the communications position.
⍰ Handles and delivers the message to the intended recipient according to the established procedures of the EOC.
The intended recipient composes a reply to the message and completes the signature block of the reply.
The reply message is handled according to the established procedures of the EOC and delivered to the radio communications position for transmission. The radio operator:
⍰ Logs the outgoing message request in the ICS-214 activity log.
⍰ Establishes contact with the receiving station.
⍰ Exchanges the message with the receiving station.
⍰ Records the communications event information in the bottom margin of the ICS 213 form.
⍰ Retains a copy of the message at the communications position.
⍰ Completes the handling and filing of the message according to established procedures within the EOC.
The radio operator should expect occasional inquires about the messages that were received and sent.

It is important that the message events be logged in the ICS 214 and the ICS 213 forms so that the flow of messages can be tracked and the status of a particular series of exchanged messages is known. It is also important that the operator position retains a copy of the message forms. For this reason, experienced radio operators know to expect occasional pauses with other stations as they process and update information in these logs and forms.

Section II.A.2 Modification of ICS Forms Including ICS-213

One of the reasons that ICS is successful is the use of common terminology. The use of common terminology allows personnel from different organizations to communicate with each other without being misunderstood.

“ICS-213” is the name of the ICS General Message Form. The official ICS forms are published by the National Wildfire Coordinating Group (NWCG) for wildfire ICS and by the Federal Emergency Management Agency (FEMA) for all-hazards ICS. ICS-213 doesn’t refer to just any general message form; it refers to the official form. When amateurs modify the official ICS-213 and publish it with the same name, they violate the common terminology principle of ICS — now there are two or more things that have the same name but are not the same.

Naming the form in the style of ICS forms, such as ICS-213AR, implies that it is an ICS form approved by the same authority that approves all ICS forms. Sometimes modified forms will carry other designations that compound the confusion, implying endorsement where none exists. For example, there exists a modified ICS-213 form that bears the designations “ICS-213” and “NFES 1336.” NFES 1336 is the ordering code in the National Fire Equipment System for the NWCG ICS-213 General Message Form. Someone could order printed forms from NWCG and not get what they thought they were ordering. To avoid creating confusion about which form is which:

1. Whenever modifying an existing official form, it is important to remove all agency names and modify form number designations, etc., that are unique to the original forms, unless the form contains a specific prohibition on making changes. Forms created by the US Government are usually in the public domain (17 U.S.C. 105) and changes can usually be made to them. For example, if changes are made to form ICS 213, remove "ICS 213" and "NFES 1336" if they appear on the original General Message Form, to make users aware that the form has been modified.

2. Do not make up a designation that resembles any other widely-accepted designation style. For example, do not label your Amateur Radio General Message Form as ICS-213AR. Instead use plain language (another ICS principle) — label it something like "Amateur Radio General Message Form," or if necessary to have a code, something like AR-MSG, or something that won't imply it is an official ICS form.

3. Consider giving credit to the source in a line at the bottom, such as "Based on FEMA Form ICS 213" — doing so makes it clear that this form is not the official ICS 213.
Those who designed the official ICS forms established a system to periodically review and update their forms. If blocks to track message transmission need to be added to the official ICS forms, the case can be made to the forms review committee; it is for them to decide on the final design and to publish the new official version. Until then, amateurs can write the message tracking information they desire by hand in the top or bottom margin of the official ICS 213 form; or they can create their own version, as long as they take care to avoid confusion between their message form and the official form.

II.B.6 NTS Messaging Forms

During an operation, messages may be received into the communications group from a representative of the National Traffic System on one of two forms.

⍰ ARRL Radiogram
⍰ FSD-244 Amateur Radio Disaster Welfare Message

Though both documents are very similar in format and content, the FSD-244 is more specifically dedicated to relating information specifically related to an incident or disaster. If the operator receives a message in either of these formats it should be forwarded on to its intended recipient in the same format it is received unless the operator is instructed otherwise.

II.C Mutual Aid Strike Team-Mutual assistance Teams

The EmComm Mutual Assistance Team (EmComm MAT) concept recognizes that any local EmComm team resources can be quickly overwhelmed in a large-scale disaster. EmComm operators in the affected areas may be preoccupied with mitigation of their own personal situations and therefore not be able to respond in local disaster operations. Accordingly, communications support must come from skilled EmComm personnel outside the affected areas.

This is when help may be requested from neighboring area EmComm teams.
To affect inter-sectional support mechanisms, each Section Emergency Coordinator (SEC) should consider adopting the following principles in their EmComm planning:

⍰ Pre-disaster planning with other sections in the Division, and adjoining Sections outside the Division. Planning should be conducted through written memoranda, and in-person at conventions and director-called cabinet meetings. An EmComm MAT inter-sectional emergency response plan should be drafted.
⍰ Development of a roster of ARES members able, willing, and trained to travel to neighboring sections to provide communication support inside the disaster area.
⍰ Inter-sectional communication/coordination during and immediately following the onslaught of the disaster.
⍰ Post-event evaluation and subsequent revision/updating of the inter-sectional emergency response plan. When developing EmComMAT plans, EmComm leadership should include the following basic action elements:

II.C.1 Pre-Departure Functions

Team leaders should provide EmComm MAT members with notification of activation/ assignment. Credentials should be provided for recognition by local authorities. They should provide a general and technical briefing on information drawn principally from the requesting authority, supplemented by reports from Amateur Radio, commercial radio, W1AW bulletins, and ARRL officials. The briefing should include an overview of equipment and communication needs, EmComm leadership contacts, and conditions in the disaster area. The host SEC's invitation, transportation (including routes in disaster area), and accommodations considerations, and expected length of deployment should all also be reviewed with the team members.

II.C.2 In-Travel Functions

Before and while in travel to the affected areas, team leaders should review the situation's status with the team: job assignments, checklists, affected area profile, mission disaster relief plan, strengths and weaknesses of previous and current responses, maps, technical documents, contact lists, tactical operation procedures, and response team requirements.

II.C.3 Arrival Functions

Upon arrival, team leaders should check with host EmComm officials and obtain information about frequencies in use, current actions, available personnel, communication and computer equipment, and support facilities that could be used by the team to support the relief effort. The host's EmComm/ARES/RACES plan in effect for the disaster should be obtained. A priority upon arrival should be the establishment of an initial intra-team communication network and an HF or VHF channel back to the home Section for morale traffic. Team leaders should meet with local response officials, Amateur Radio clubs' communications staff, local ARRL field organization officials, and others as needed to obtain information and coordinate the use of frequencies. Communication site selections should take into account team requirements and local constraints.

If the incident response is organized as an Incident Command System (ICS) structure, the team could be directed to report to a staging area or the Incident Command Post. After all personnel go through the check-in process, the team leader would meet with the Communications Unit Leader (COML) to advise the COML of the EmComm MAT capabilities, and to receive an assignment from the COML. Once the EmComm MAT checks in as a resource to the COML, the team takes direction only from the COML — ARES leaders such as the Emergency Coordinator (EC), District Emergency Coordinator (DEC), or Section Emergency Coordinator (SEC) provide coordination, not command and control if this is an ARES operation. Do not violate the ICS principle of "unity of command" — each person working under the ICS has one, and only one, boss.

II.C.4 On-Site Functions

Team leaders should make an initial assessment of functioning communication facilities (ICS: receive this information from the COML) and monitor host ARES officials' communications, and other response team relief efforts to coordinate operations and reduce duplication of effort. Team members should be monitored and their capabilities to perform their duties evaluated. Proper safety practices and procedures must be followed. A daily critique of communication effectiveness with served units and communication personnel should be conducted.

II.C.5 Pre-Demobilization and Demobilization Functions

An extraction procedure for ham communicators should be negotiated with served agencies and host ARES officials before it is needed (ICS: demobilization will be covered during the check-in process, and updated with each revision of the Incident Action Plan). To get volunteers' commitment to travel and participate, they must be assured that there will be an end to their commitment. Open-ended commitments of volunteers are undesirable, partly because they make potential volunteers hesitate to become involved.

Leaders must coordinate with the host ARES officials and served agencies, and other functions to determine when equipment and personnel are no longer needed. A demobilization plan should be in effect.

A team critique, begun on the trip home, should be conducted. Individual performance evaluations on team members should be prepared. Copies of critiques should be sent to both the home SEC and indisaster SEC. Problems stemming from personality conflicts should be addressed and/or resolved outside of formal reports, as they only provide distractions to the reports. Equipment should be accounted for. A post-event evaluation meeting should always be conducted, and a final report prepared so that an update to the inter-sectional EmComm MAT plan can be made.

II.C.6 EMComm MAT Member Qualifications

The individual filling the role of EmComm MAT member must have high performance standards, qualifications, experience, and the ability to work with a diverse group of team members that will be required to provide relief to the affected areas. He or she must be able to work efficiently in a disaster relief operation under the most adverse conditions.

Additionally, a member should have demonstrated ability to be an effective team player, in crisis situations, a strong personal desire, and strong interpersonal communication skills. Knowledge of how ARRL, American Red Cross, and other agencies function at both the national and local levels is helpful. A working knowledge of the Incident Command System is useful as many events are managed under this system. Members should be respected and recognized by officials and peers as competent communicators and should understand a broad range of disaster response organizations' capabilities and communication requirements.

Important: Members must be available, with the consent of their employer, to participate! They should be physically fit to perform arduous work under adverse environmental conditions. Availability of refrigeration for temperature-sensitive medications cannot be assumed.

MAT Summary

It should be noted that there is a fine balance of authority over a deployed EmComm MAT. The in-disaster SEC (or delegated authority) should be able to make decisions as to use and deployment of an incoming team (ICS: the team serves at the direction of the COML, and is not available to the SEC until released by the COML). Therefore, an incoming team should be prepared to submit themselves to such authority; this is evidenced by the fact that any team, internal or external, has only a limited view of the overall operation. The supervising authorities will have a better overview of the whole situation.

In turn, however, the in-disaster authority should be discouraged from abusing the resources of incoming teams. Should a team no longer be required, or a situation de-escalate, the team should be released at the earliest possible time, so that they may return home to their own lives.

The EmComm MAT tool should be one of last resort. Whenever possible, amateurs from the affected section should be used for support. It is a lot to ask of a volunteer to travel far from home, family, and job for extended periods of arduous and potentially dangerous work.

Section III
General Discussion from the EC Manual (The ARRL Communications Course Level 1 (Gleaned from EC - 001)

IIIA: ICS

As the size and complexity of a response increase, and as other agencies become involved, the various tasks can be re-assigned and sub-divided. For instance, if the only responding agency is the fire department, communications will be handled according to existing department policies. If the incident expands, more agencies become involved, and other communication assets are required, a Logistics Chief may handle communication decisions along with other tasks, or assign the job to a "communication task force leader" as his own workload increases.

The Incident Commander

The initial IC is usually the most senior on-scene officer from the first responding agency. The IC is responsible for the management of the incident and starts the process by helping setting initial incident objectives, followed by an "Incident Plan" (IP). In a small incident, the IC may do all the ICS functions without aid, but in a larger incident, they will usually delegate responsibilities to others. The IC still has overall responsibility for the incident, regardless of any duties delegated. The persons filling certain ICS positions may change several times during an incident as the needs of the response change. For instance, in the early stages of a hazardous materials spill, the Incident Commander may be a fire department officer. As the Coast Guard or other federal agency arrives to begin cleanup efforts, one of their officers will become the Incident Commander.

How Does an Emcomm Group "Fit Into" The ICS

Involvement in any incident where ICS is used is by "invitation only"—there is no role for off-the-street volunteers. The relationship of an EmComm group to the ICS structure will vary with the specific situation.

If your group is providing internal communication support to only one responding agency, and has no need to communicate with other agencies that are part of the ICS, you may not have any part in the ICS structure itself except through your served agency. If your group is tasked with handling inter-agency communications, or serves more than one agency's internal communication needs, it is likely your group will have a representative on the Logistics Section's "communication task force."

In certain situations, an EmComm group might serve one or more agencies simultaneously. As the responsibility for managing the incident shifts from one agency to another, the EmComm group's mission may shift to assisting the new lead agency, or simply end. In some cases, your group might begin by supporting your own served agency, and end up supporting a new and unfamiliar agency. The choice of whether to use your EmComm group's services may be made by the served agency, Communications Task Force leader, Logistics Chief, or Incident Commander, depending on the specific situation and the degree of ICS structure in use.

III.B Basic Communication Skills: General Good Operating Practices and Essentialities

Information:
An emergency communicator must do his part to get every message to its intended recipient, quickly, accurately, and with a minimum of fuss. A number of factors can affect your ability to do this, including your own operating skills, the communication method used, a variety of noise problems, the skills of the receiving party, the cooperation of others, and adequate resources. In this unit, we will discuss basic personal operating skills. Many of the other factors will be covered in later units.

Life and death communications are not part of our daily experience. Most of what we say and do each day does not have the potential to severely impact the lives and property of hundreds or thousands of people. In an emergency, any given message can have huge and often unintended consequences. An unclear message, or one that is modified, delayed, misdelivered or never delivered at all can have disastrous results.

Listening
Listening is at least 50% of communication. Discipline yourself to focus on your job and "tune out" distractions. If your attention drifts at the wrong time, you could miss a critical message. Listening also means avoiding unnecessary transmissions. A wise person once said, "A man has two ears and one mouth. Therefore he should listen twice as much as he talks." While you are asking, "when will the cots arrive?" for the fourth time that hour, someone else with a life and death emergency might be prevented from calling for help.

Sometimes the job of listening is complicated by noise. You might be operating from a noisy location, the signal might be weak or other stations may be causing interference. In each of these cases, it helps to have headphones to minimize local noise and help you concentrate on the radio signal. Digital Signal Processing (DSP), filters and other technologies may also help to reduce radio noise and interference.

Microphone Techniques

Even something as simple as using your microphone correctly can make a big difference in intelligibility. For optimum performance, hold the mic close to your cheek, and just off to the side of your mouth. Talk across, rather than into, the microphone. This will reduce breath noises and "popping" sounds that can mask your speech.

Speak in a normal, clear, calm voice. Raising your voice or shouting can result in overmodulation and distortion, and will not increase volume at the receiving end. Speak at a normal pace—rushing your words can result in slurred and unintelligible speech. Pronounce words carefully, making sure to enunciate each syllable and sound.

Radios should be adjusted so that a normal voice within 2 inches of the mic element will produce full modulation. If your microphone gain is set so high that you can achieve full modulation with the mic in your lap, it will also pick up extraneous background noise that can mask or garble your voice. A noise-canceling microphone is a good choice since it blocks out nearly all unwanted background noise, and is available in handheld and headset boom mics Headset boom microphones are becoming less expensive and more popular, but care should be taken to choose one with a cardioid or other noise canceling type element. Many low-cost headset boom mics have omni-directional elements, and will pick up extraneous noise.

"Voice operated transmission" (VOX) is not recommended for emergency communication. It is too easy for background noise and off-air operator comments to be accidentally transmitted, resulting in embarrassment or a disrupted net. Use a hand or foot switch instead.

When using a repeater, be sure to leave a little extra time between pressing the push-to-talk switch and speaking. A variety of delays can occur within a system, including CTCSS decode time, and transmitter rise time. Some repeaters also have a short "kerchunk" timer to prevent brief key-ups and noise from keying the transmitter. It also gives time for some handhelds to come out of the "power-saver" mode. Leaving extra time is also necessary on any system of linked repeaters, to allow time for all the links to begin transmitting. These techniques will ensure that your entire message is transmitted, avoiding time-wasting repeats for lost first words.

Lastly, pause a little longer than usual between transmissions any time there is a possibility that other stations may have emergency traffic to pass from time to time. A count of “one, one thousand” is usually sufficient.

Brevity & Clarity

Each communication should consist of only the information necessary to get the message across clearly and accurately. Extraneous information can distract the recipient and lead to misinterpretation and confusion. If you are the message’s author and can leave a word out without changing the meaning of a message, leave it out. If the description of an item will not add to the understanding of the subject of the message, leave it out. Avoid using contractions within your messages. Words like “don’t” and “isn’t” are easily confused. If someone else has drafted the message, work with the author to make it more concise. Make your transmissions sound crisp and professional, like the police and fire radio dispatchers and the air traffic controllers. Do not editorialize, or engage in chitchat. An emergency net is no place for “Hi Larry, long time no hear”, “Hey, you know that rig you were telling me about last month….” or any other non-essential conversation. Be sure to say exactly what you mean. Use specific words to ensure that your precise meaning is conveyed. Do not say, “that place we were talking about,” when “Richards School” is what you mean. Using non-specific language can lead to misunderstandings and confusion.

Communicate *one complete subject* at a time. Mixing different subjects into one message can cause misunderstandings and confusion. If you are sending a list of additional food supplies needed, keep it separate from a message asking for more sand bags. Chances are that the two requests will have to be forwarded to different locations, and if combined one request will be lost.

Plain Language

As hams, we use a great deal of “jargon” (technical slang) and specialized terminology in our daily conversations. Most of us understand each other when we do, and if we do not on occasion it usually makes little difference. In an emergency, however, the results can be much different. A misunderstood message could cost someone’s life.
Not everyone involved in an emergency communication situation will understand our slang and technical jargon. Even terms used by hams vary from one region to another, and non-hams will have no knowledge of most of our terminology. Hams assisting from another region might understand certain jargon very differently from local hams.

For these reasons, all messages and communications during an emergency should be in plain language. “Q” signals (except in CW communication), 10 codes and similar jargon should be avoided. The one exception to this is the list of standard “pro-words” (often called “pro-signs”) used in Amateur traffic nets, such as “clear”, “say again all after” and so on.

Avoid words or phrases that carry strong emotions. Most emergency situations are emotionally charged already, and you do not need to add to the problem. For instance, instead of saying, “horrific damage and people torn to bits,” you might say “significant physical damage and serious personal injuries.”

Phonetics

Certain words in a message may not be immediately understood. This might be the case with an unusual place name, such as “Franconia” or an unusual last name, like “Smythe.” The best way to be sure it is understood correctly is to spell it. The trouble is, if you just spell the word using letters, it might still be misunderstood, since many letters sound alike at the other end of a radio circuit.“Z” and “C” are two good examples. For that reason, radio communicators often use “phonetics.” These are specific words that begin with the letter being sent. For instance, “ARRL” might be spoken as “alpha romeo romeo lima”.

To reduce requests to repeat words, use phonetics anytime a word has an unusual or difficult spelling, or may be easily misunderstood. Do not spell common words unless the receiving station asks you to. In some cases, they may ask for the phonetic spelling of a common word to clear up confusion over what has been received.

Standard practice is to first say the word, “I spell,” then spell the word phonetically. This lets the receiving station know you are about to spell the word he just heard. Several different phonetic alphabets are in common use, but most hams and public safety agencies use the ITU Phonetic Alphabet, shown below, and others use military alphabets.

Many hams like to make up their own phonetics, especially as a memory aid for callsigns, and often with humorous results. Unfortunately, this practice has no place in emergency communication. In poor conditions, unusual phonetic words might also be misunderstood. We need to be sure that what we say is always interpreted exactly as intended— this is why most professional communicators use standardized phonetics.

ITU Phonetic Alphabet

A—alpha (AL-fa)
B—bravo (BRAH-voh)
C—charlie (CHAR-lee)
D—delta (DELL-tah)
E—echo (ECK-oh)
F—foxtrot (FOKS-trot)
G—golf (GOLF)
H—hotel (HOH-tell)
I—india (IN-dee-ah)
J—juliet (JU-lee-ett)
K—kilo (KEY-loh)
L—lima (LEE-mah)
M—mike (MIKE)
N—november (no-VEM-ber)
O—oscar (OSS-cah)
P—papa (PAH-PAH)

Q—quebec (kay-BECK)
R—romeo (ROW-me-oh)
S—sierra (SEE-air-rah)
T—tango (TANG-go)
U—uniform (YOU-ni-form)
V—victor (VIK-tor)
W—whiskey (WISS-key)
X—x-ray (ECKS-ray)
Y—yankee (YANG-key)
Z—zulu (ZOO-loo)

Numbers are somewhat easier to understand. Most can be made clearer by simply **“over-enunciating”** them as shown below.
One: “Wun”
Two: “TOOO”
Three: “THUH-ree”
Four: “FOH-wer”
Five: “FY-ive”
Six: “Sicks”
Seven: “SEV-vin”
Eight: “Ate”
Nine: “NINE-er
Zero: “ZEE-row”

Numbers are always pronounced individually. The number “60” is spoken as “six zero”, not “sixty”. The number “509” is spoken as “five zero nine”, and not as “five hundred nine” NOR “five oh nine”.

Pro-words

Pro-words, called “pro-signs” when sent in Morse Code or digital modes, are procedural terms with specific meanings. (“Pro” is short for “procedural.”) They are used to save time and ensure that everyone understands precisely what is being said. Some pro-words are used in general communication, others while sending and receiving formal messages.

Voice	Morse/ Digital*	Meaning and function
Clear	SK*	End of contact. In CW, SK* is sent before final identification
Over	KN	Used to let a specific station know to respond
Go ahead	K	Used to indicate that any station may respond
Out	CL	Leaving the air, will not be listening
Stand by	AS*	A temporary interruption of the contact
Roger	R	Indicates that a transmission has been received correctly and in full

* Two letters are sent as one character in CW

Tactical Call Signs

Tactical call signs can identify the station's location or its purpose during an event, regardless of who is operating the station. This is an important concept. The tactical call sign allows you to contact a station without knowing the FCC call sign of the operator. It virtually eliminates confusion at shift changes or at stations with multiple operators.

Tactical call signs should be used for all emergency nets and public service events if there are more than just a few participants.

If one does not already exist, the NCS may assign the tactical call sign as each location is "opened." Tactical call signs will usually provide some information about the location or its purpose. It is often helpful if the tactical call signs have a meaning that matches the way in which the served agency identifies the location or function.

Some examples are:
"Net"—for net control station
"Springfield EOC"—for the city's Emergency Operations Center
"Firebase 1"—for the first fire base established, or a primary fire base
"Checkpoint 1"—for the first check point in a public service event
"Canyon Shelter"—for the Red Cross shelter at Canyon School
"Repair 1"—for the roving repair vehicle at a bike-a-thon
"Mercy"—for Mercy Hospital

Calling with Tactical Call Signs

If you are at "Aid 3" during a directed net and want to contact the net control station, you would say "Net, Aid 3" or, in crisper nets (and where the NCS is paying close attention), simply "Aid 3". If you had emergency traffic, you would say "Aid 3, emergency traffic," or for priority traffic "Aid 3, priority traffic." Notice how you have quickly conveyed all the information necessary, and have not used any extra words.

If you have traffic for a specific location, such as Firebase 5, you would say "Aid 3, priority traffic for Firebase 5." This tells the NCS everything needed to correctly direct the message. If there is no other traffic holding, the NCS will then call Firebase 5 with, "Firebase 5, call Aid 3 for priority traffic."

Note that no FCC call signs have been used so far. None are necessary when you are calling another station.

Station Identification

In addition to satisfying the FCC's rules, proper station identification is essential to promoting the efficient operation of a net. The FCC requires that you identify at ten-minute intervals during a conversation and at the end of your last transmission. During periods of heavy activity in tactical nets it is easy to forget when you last identified, but if you identify at the end of each transmission, you will waste valuable time. What to do?

The easiest way to be sure you fulfill FCC station identification requirements during a net is to give your FCC call sign as you complete each *exchange*. Most exchanges will be far shorter than ten minutes. This serves two important functions:

1) It tells the NCS that you consider the exchange complete (and saves time and extra words)
2) It fulfills all FCC identification requirements.

Completing a Call

After the message has been sent, you would complete the call from Aid 3 by saying "Aid 3, <*your call sign*>". This fulfills your station identification requirements and tells the NCS that you believe the exchange to be complete.

If the Net Control Station believes the exchange is complete, and Aid 3 had forgotten to identify, then the NCS should say, "Aid 3, do you have further traffic?" At that point, Aid 3 should either continue with the traffic, or voice "clear" by identifying as above.

For this method to work properly, the NCS must allow each station the opportunity to identify at the close of an exchange.

A Review of Habits to Avoid:

Thinking aloud on the air: "Ahhh, let me see.
Hmm. Well, you know, if…"
On-air arguments or criticism
Rambling commentaries
Shouting into your microphone
"Cute" phonetics
Identifying every time you key or un-key the mic
Using "10" codes, Q-signals on phone, or anything other than "plain language"
Speaking without planning your message in advance
Talking just to pass the time.

Reference links:

- The Public Service Communications Manual: **www.arrl.org/FandES/field/pscm/index.html**
- ARRL ARES Field Manual: **www.arrl.org/FandES.field/aresman.pdf**

Review:

Clear, concise communications save time and reduce misunderstandings. Avoid any nonessential transmissions. Use tactical call signs to call other stations, and give your FCC call sign only at the end of the complete exchange, or every ten minutes during longer exchanges. Plain language is more easily understood by a wider range of people than most codes and jargon.

Additional Student activities:

1. Using what you have learned, edit the following exchange to make it clear and concise.
"KA1XYZ at Ramapo Base, this is Bob, K2ABC at Weston EOC calling."
"K2ABC, this is KA1XYZ. Hi, Bob. This is Ramapo Base, Harry at the mic. Go ahead. K2ABC from KA1XYZ."
"KA1XYZ, this is K2ABC returning. Hi, Harry. I have a message for you. By the way, remember to call me later about the get-together the club is having next month. Are you ready to copy the message?" KA1XYZ, this is K2ABC, over to you Harry."

III. C Introduction to Emergency Nets

Information:

What is an Emergency Net?

The purpose of any net is to provide a means for orderly communication within a group of stations. An "emergency" net is a group of stations who provide communication to one or more served agencies, or to the general public, in a communications emergency. An emergency net may be formal or informal, depending on the number of participants and volume of messages.

Net Formats

Directed (formal) Nets: In a directed net, a "net control station" (NCS) organizes and controls all activity. One station wishing to call or send a message to another in the net must first receive permission from the NCS. This is done so that messages with a higher priority will be handled first, and that all messages will be handled in an orderly fashion. Directed nets are the best format when there are a large number of member stations. (Be careful not to confuse "formal nets" with "formal messages." There is no definite link between the two. A formal net may handle informal messages, and vice versa.)

Open (informal) Nets: In an open net, the NCS is optional. Stations may call each other directly. When a NCS is used at all, he usually exerts minimal control over the net. The NCS may step in when the message volume increases for short periods, or to solve problems and keep the net operating smoothly. Open nets are most often used when there are only a few stations and little traffic.

Types of Emergency Nets

Emergency nets may have different purposes, and a given emergency may require one or more of each type of net. During a small operation, all functions may be combined into one net.

- **A traffic net** handles formal written messages in a specified (i.e. ARRL) format. The nets operated by the National Traffic System (NTS) are an excellent example of traffic nets. ARES or RACES traffic nets may be directed or open depending on their size.
- **Tactical nets** are used for real-time coordination of activities related to the emergency. This

is a faster moving, often less formal operation. Messages are usually brief, and frequently **unwritten.** A tactical net usually has a NCS, but may be directed or open. The NCS may have other duties or responsibilities as well.

- A **"resource" or "logistics"** net may be needed to acquire resources and volunteers, and handle assignments. It is usually a directed net. Resource nets accept check-ins from arriving volunteers, who are then directed to contact an appropriate station or to proceed to a specific location. It might also be used to locate needed resources, such as equipment, food, water and other supplies for emcomm volunteers.

- An **information net** is usually an open net used to collect or share information on a developing situation, without overly restricting the use of the frequency by others. Net members send updated local information as needed, and official bulletins from the served agency may be sent by the NCS (if the net has one), an agency liaison station or an Official Bulletin Station (OBS). The NCS and many of the participants monitor the frequency, but a "roll call" is seldom taken and stations may not be expected to check in and out of the net. The operation of an information net also serves as notice to all stations that a more formal net may be activated at any moment if conditions warrant. A good example is a SKYWARN weather net activated during a severe storm watch.

Checking Into an Emergency Net

There are two situations where you will need to "check in" to a net.

1. When you first join the net.
2. When you have messages, questions or information to send.

If you are part of the organization operating the net, simply follow the instructions for checking into directed and open nets as discussed below.

To become part of a directed net, listen for the NCS to ask for "check-ins" and listen to any specific instructions, such as "check-ins with emergency traffic only." At the appropriate time, give only your call sign. If you have a message to pass, you can add, "with traffic." If it is an emergency message, say "with emergency traffic." The same is true for stations with priority traffic. Wait for a response before offering more information. Checking into a directed net when the NCS has not asked for check-ins is usually considered a bad practice. However, if a long period passes with no request, you might wait for a pause in the net's activity and briefly call the NCS like this: "Net control, W1FN, with traffic."

To check in to an open net for the first time, briefly call the net control station as above. If there appears to be no NCS, call anyone on the net to find out if anyone is "in charge" and make contact with them. If you are already part of the net and have a message to send, simply wait for the frequency to be clear before calling another station.

If you are not part of the organization operating the net, do not just check in and offer to assist. Listen for a while. Be sure you have something specific to offer before checking in, (such as the ability to deliver a message close to your location when none of the regular net members can). If they really do seem to need help that you feel you can provide, you might check in briefly to ask if they have a "resource" net in operation, then switch to that frequency. If not make a brief offer of assistance to the NCS. Do not be too surprised if you receive a cool reception to your offer of help. It is usually nothing personal. Emergency nets are serious business. Most EmComm managers prefer to deal with people with known training and capabilities, and with whom they have worked before. You may not have the experience, skills or official credentials they require—and they have no way of knowing what your true capabilities are. Some EmComm managers will assign you as an apprentice, logger, or as a "runner." If you are given such an opportunity, take it! It is all good experience and a great way to introduce yourself to the group. Better yet, become involved with your local EmComm group now—do not wait for the next disaster.

Passing Messages in a Directed Net

If you told the NCS you have traffic to send when you checked in, he will probably ask you to "list your traffic" with its destination and priority.

After you send your list, the NCS will direct you to pass each message to the appropriate station in the net, either on the net frequency, or another frequency to avoid tying up the net. When moving to another frequency to pass the message, always check to see if the frequency is in use before beginning.

When you are asked by the NCS to send your message, the standard procedure is for the NCS to tell the receiving station to call the sending station.

The entire exchange might sound like this:

NCS: "W1AW, list your traffic."
You: "W1AW, two priority for Springfield
EOC, one welfare for the Section net."
NCS: "Springfield EOC, call W1AW for your traffic."
Springfield EOC: "W1AW, Springfield EOC, go ahead."
You: "Number 25, Priority etc…"

(After you have sent your messages to the Springfield EOC, the NCS will next direct the section net liaison station to call you for their message.)

When you have finished, simply sign with any tactical call sign and your FCC call.

(You will learn more about messages and message handling and "emergency," "priority," and other precedences later.)

Checking Out of an Emergency Net

Always let the NCS know when you are leaving the net, even if it is only for a few minutes. If the NCS believes you are still in the net, they may become concerned about your unexplained absence. This could result in someone being unnecessarily dispatched to check on your wellbeing.

There are three reasons for checking out of (leaving) a net.

- The location of your station is closing.
If the NCS has given you directions to close the location, simply acknowledge the request, and sign with your tactical call sign, if you are using one, and your FCC call sign. If the order to close has come from a local official, state that your location has been closed, along with the name and title of the official who ordered it, and sign off as above. Long "goodbyes" only tie up the net needlessly, and do not sound very professional.

- You need a break and there is no relief operator. Tell the NCS that you will be away from the radio for a certain length of time, the reason and sign with your tactical call sign, if you are using one, and your FCC call sign.

- You have turned the location over to another operator. Tell the NCS that you have turned the station over to (give the new operator's name and FCC call sign), and that you are leaving. Sign with your tactical call sign, if you are using one, and your FCC call sign.

There are two special situations to be aware of:

If someone in authority asks you, such as a law enforcement officer, to move your station, then move immediately and without argument. Notify the NCS of the situation at the first appropriate opportunity.
If you are requested by someone in authority to turn off your radio, or to refrain from transmitting, do so immediately and without question. Do not notify Net Control until you have permission to transmit again, and can do so safely. There is

Objective: This lesson provides an overview of operations in a radio network, or "net" environment. It sets the stage for the following lessons, which present various aspects of net operation and message handling in greater detail. This lesson contains information that is appropriate for net operations in a variety of settings, and is representative of nets around the country. Local procedures may vary slightly.

Student preparation required:
Learn the following definitions:

Net: A group of stations who gather on one frequency, with a common purpose. The net provides a structure and organization to allow an orderly flow of messages.

Net Control Station (NCS): The station in charge of the net, and directing the flow of messages and general communications.

Formal Messages: Written messages that are sent in a standardized format.
Informal or "Tactical" Messages: brief verbal or informal written messages, intended for direct and immediate delivery.

Traffic: A term referring to messages sent over Amateur Radio, usually formal, written messages. More generally, any messages or activity on a particular frequency.

Pass: to send messages from one station to another.

Third Party Traffic: Messages transmitted on behalf of a person or organization other than a licensed Amateur Radio operator. This term also applies to when a person other than a licensed operator is allowed to use the microphone.

Liaison Station: A station responsible for passing messages between two different nets in an orderly fashion. Directed nets are the best format when there are a large number of member stations. (Be careful not to confuse "formal nets" with "formal messages." There is no definite link between the two. A formal net may handle informal messages, and vice versa.)

Open (informal) Nets: In an open net, the NCS is optional. Stations may call each other directly. When a NCS is used at all, he usually exerts minimal control over the net. The NCS may step in when the message volume increases for short periods, or to solve problems and keep the net operating smoothly. Open nets are most often used when there are only a few stations and little traffic.

Emergency nets may have different purposes, and a given emergency may require one or more of each type of net. During a small operation, all functions may be combined into one net.

"Breaking" the Net

If the net is in progress, and you have emergency traffic to send, you may need to "break" into the net. Procedures for doing this vary from net to net, but the most common method is to wait for a pause between transmissions and simply say, "Break, WA1ZCN." The NCS will say, "Go ahead WA1ZCN," and you respond, "WA1ZCN with emergency traffic."

ARES or RACES can use a similar structure on a smaller scale. For instance, each city might have a local FM net. A county net would handle messages going from city to city. A section HF net would handle messages from county to county. Any net in such a system could have "liaison" stations to pass into the NTS any messages that need to travel out of the section.

The Nets of the National Traffic System

The National Traffic System (NTS) was created by the ARRL and authored by George

Hart, W1NJM in 1949 to handle medium and long distance traffic. In an emergency, The National Traffic System can be used to provide a link from the area impacted by the emergency to the outside world. The National Traffic System is a hierarchical (layered) set of nets, beginning at the local level with the Local nets and continuing through the Section Nets, Region Nets, Area Nets and finally the Transcontinental Corps. Assigned "liaison" stations pass messages between various nets as necessary to reach their final destination.

These nets operate in carefully designed "cycles" that allow a message to move smoothly and efficiently from one net to the next across the country in 24 hours. Each message follows a predetermined path to its destination.

The details of NTS operation are quite complex and well beyond the scope of this book. To learn more about the NTS, visit the NTS section of the ARRL Web site or contact your Section Manager or NTS Section Traffic Manager.

Non-Voice Nets

Emergency nets may also use other modes of communication besides voice (phone). Traffic nets have used CW since the beginning of Amateur Radio, and it is still a viable option for long distance formal traffic. High-speed CW nets can actually handle more messages per hour than most voice nets.

Packet communication on VHF and UHF is often used for local communication where accuracy and a record of the message are required.
HF digital modes such as AMTOR and PACTOR are used on long distance circuits. Many groups are now experimenting with emergency communication applications for newer modes such as PSK31 on HF and VHF/UHF bands.
The latest end-to-end message handling system to get the attention of the EmComm community is "WinLink 2000," an automatic system that blends radio and Internet transmission paths to permit rapid and seamless e-mail message transfer to stations anywhere on Earth. For most emergencies, it will be possible for stations in the affected area to link to a WinLink 2000 PACTOR node outside the affected area, allowing rapid contact with the outside world.

Most CW nets are directed nets. Packet nets are not generally directed by a human, due the automatic "store and forward" nature of the mode, and are usually operated as open nets with no NCS.

Reference links:

To learn about **NTS** in your area, contact your Section Manager (SM), or Section Traffic Manager (STM). To locate your Section Manager (SM), see the ARRL Section Manager List at **HYPERLINK "http://www.arrl.org/field/org/smlist.html"** **www.arrl.org/field/org/smlist.html**.
For a **list of ARES and NTS nets** in your area see **www.arrl.org/FandES/field/nets/**

Winlink 2000: **www.winlink.org**
Fnpack: **www.w1fn.org** - a Windows ® packet radio terminal program designed for EmComm.
FNpsk: **www.w1fn.org** - similar to FNpack, but for PSK-31.

Review:
Large nets are usually directed (formal) nets with a NCS in charge. Smaller nets may be “open” (informal), and a NCS is optional. Nets can serve many purposes, including passing formal messages, handling logistics, or passing informal tactical messages. Large emergencies may require more than one of each type of net – small emergencies may have one combined net.
Medium and long distance messages are often handled by the National Traffic System (NTS).

III.C Basic Message Handling Part 1

Objective: This lesson is intended to provide basic knowledge for both formal and informal message handling, but is not intended to make you an “expert.” Further study and practice on your own will be necessary. The Level II course in this series provides more advanced information on net operations and message handling.

Information:
Consider the following scenario: There are 330 hurricane evacuees in a Red Cross shelter. ARES is providing communications, working in 12-hour shifts. An elderly diabetic woman is brought in at 1400 hours. She will require her next dose of insulin by 2300 hours. The manager goes to the radio room. There is an operator wearing a red baseball hat with funny numbers and letters on it. He asks the operator to inform the county EOC of the medication need. The operator calls the Red Cross EOC and says, “Hey, we have a diabetic lady here who will need insulin by 2300 hours,” but doesn’t write the message down or log the request.

At 2030 hours the medication has still not been delivered. The shelter manager goes to the radio room to inquire about its status. There is now a different person with a blue baseball cap with a new set of funny letters and numbers. He knows nothing of the earlier request, but promises to “check on it.” In the meantime, EOC personnel have discarded the message because it was written on a scrap of paper and had no signature authorizing the order for medication. No one sent a return message requesting authorization.

If each operator had generated and properly logged a formal message, with an authorized signature, it would be a relatively simple matter to track. The informal message has no tracks to follow. Also, by sending a formal message, you are nearly guaranteeing that the receiving station will write it down properly (with a signature) and log it, greatly enhancing it chances of being delivered intact.

Formal vs. Informal Messages

Both formal (written in a specific format, i.e. ARRL) and informal (verbal or written but not in a specific format) messages have their place in emergency communication. In general, informal messages are best used for non-critical and simple messages, or messages that require immediate action, those are delivered directly from the author to the recipient. Formal messages are more appropriate when two or more people will handle them before reaching the recipient, or where the contents are critical or contain important details. The most common formal message format is that used by ARRL's NTS, discussed below.

Informal Verbal Messages

Some emergency messages are best sent informally in the interest of saving precious seconds. If you need an ambulance for a severely bleeding victim, you do not have time to compose and send a formal message. The resulting delay could cause the patient's death. Other messages do not require a formal written message because they have little value

Example: Letting the net control station know where you are or when you will arrive need not be formal. The message is going directly to its recipient, is simple and clear, and has little detail. Many of the messages handled on a tactical net fit this description.

ARRL/ARES Formal Written Message Formats

A **standard** written message format is used so that everyone knows what to expect. This increases the speed and accuracy with which you can handle messages.
The ARRL message form, or "Radiogram," is a standard format used for passing messages on various nets, and is required for all messages sent through the National Traffic System. While this format may not be perfect for all applications, it serves as a baseline that can be readily adapted for use within a specific served agency. Regular practice with creating and sending messages in any standard format is recommended.

Components of a Standard ARRL Radiogram:

The standard Radiogram format is familiar to most hams from the pads of yellow-green forms available from ARRL Headquarters. The form has places for the following information:

1. The "Preamble" sometimes referred to as "the header," consists of administrative data such as the message number, originating station, message precedence (importance) and date and time of origination. The combination of the message number and the originating station serves as a unique message identifier, which can be traced if necessary. We will discuss the Preamble in greater detail below.

2. The "Address" includes the name, street address or post office box, city, state, and zip code of the recipient. The address should also include the telephone number with area code since many long distance Radiograms are ultimately delivered with a local phone call.

3. The "Text" of the message should be brief and to the point, limited to 25 words or less when possible. The text should be written in lines of five words (ten if using a keyboard) to make it easier and faster to count them for the "check." Care should be taken to avoid word contractions, as the apostrophe is not used in CW. If a word is sent without the apostrophe, its meaning could be lost or changed. The contraction for "I will" (I'll) has a very different meaning when sent without the apostrophe! Contractions are also more difficult to understand when sent by phone, especially in poor conditions. Commas and other punctuation are also not used in formal messages. Where needed, the "period" can be sent as an "X" in CW and digital modes, and spoken as "X-RAY." The "X" may be used to separate phrases or sentences, but never at the end of the text. Question marks can be used as needed, and are usually spoken as "question mark," and sometimes as "query." Both the X and question mark should be used only when the meaning of the message would not be clear without them.

4. The "Signature" can be a single name, a name and call sign, a full name and a title, "Mom and Dad," and occasionally a return address and phone number – whatever is needed to ensure that the recipient can identify the sender and that a reply message can be sent if necessary.

Details of the Preamble:

The preamble or "header" is the section of the ARRL message form where all the administrative details of the message are recorded. There are eight sections or "blocks" in the preamble. Two of them, "time filed" and "handling instructions," are optional for most messages.

Block #1 - Message Number:

This is any number assigned by the station that first puts the message into ARRL format. While any alphanumeric combination is acceptable, a common practice is to use a numeric sequence starting with the number "1"at the beginning of the emergency operation. Stations who are involved in day-to-day message handling may start numbering at the beginning of each year or each month.

Block #2 - Precedence:

The precedence tells everyone the relative urgency of a message. In all but one case, a single letter abbreviation is sent with CW or digital modes. On phone, the entire word is always spoken. Within the ARRL format, there are four levels of precedence:

Routine – abbreviated with the letter "R." Most day-to-day Amateur traffic is handled using this precedence - it is for all traffic that does not meet the requirements for a higher precedence. In a disaster situation, routine messages are seldom sent.

Welfare – abbreviated as "W." Used for an inquiry as to the health and welfare of an individual in a disaster area, or a message from a disaster victim to friends or family.

Priority – abbreviated as "P." For important messages with a time limit; any official or emergency related messages not covered by the strict Emergency definition.

EMERGENCY precedence. This precedence is usually only associated with official traffic to,from, or related to a disaster area. *EMERGENCY* – there is no abbreviation – the word EMERGENCY is always spelled out. Use this for any message having life or death urgency. This includes official messages from agencies requesting critical supplies or assistance during emergencies, or other official instructions to provide aid or relief in a disaster area. The use of this precedence should generally be limited to traffic originated and signed by authorized agency officials. *Due to the lack of privacy on radio, EMERGENCY messages should only be sent via Amateur Radio when regular communication facilities are unavailable.*

Block #3 - Handling Instructions:
This is an optional field used at the discretion of the originating station. The seven standard HX pro-signs are:
HXA – (Followed by number.) "Collect" telephone delivery authorized by addressee within (X) miles. If no number is sent, authorization is unlimited.
HXB – (Followed by number.) Cancel message if not delivered within (X) hours of filing time; service (notify) originating station.
HXC – Report date and "time of delivery" (TOD) to originating station.
HXD – Report to originating station the identity of the station who delivered the message, plus date, time and method of delivery. Also, each station to report identity of station to which relayed, plus date and time.
HXE – Delivering station to get and send reply from addressee.
HXF – (Followed by date in numbers.) Hold delivery until (specify date).
HXG – Delivery by mail or telephone – toll call not required. If toll or other expense involved, cancel message, and send service message to originating station.
If more than one HX pro-sign is used, they can be combined like this: HXAC. However, if numbers are used, such as with HXF, the HX must be repeated each time. On voice, use phonetics for the letter or letters following the HX to ensure accuracy, as in "HX Alpha."

Block #4 - Station of Origin:
This is the FCC call sign of the first station that put the message into NTS format. It is not the message's original author. For instance, you are the radio operator for a Red Cross shelter. The fire station down the street sends a runner with a message to be passed and you format and send the message.
You are the "Station of Origin," and fire station is the "Place of Origin, "which will be listed in Block 6.

Block #5 - The Check:
The "check" is the number of words in the *text section only*. Include any "periods" (written as "X," spoken as "X-Ray"). The preamble, address and signature are not included. After receiving a message, traffic handlers count the words in the message and compare the word count to the "check" number in the preamble. If the two numbers do not agree, the message should be re-read by the sending station to verify that all words were copied correctly. If the message was copied correctly and an error in the check number exists, do not replace the old count with the new count. Instead, update the count by adding a "slash" followed by the new count. For example, if the old count was five, and the correct count was six, change the check to "5/6." For more information on counting words and numbers for the check, follow this link: **www.arrl.org/FandES/ead/teacher/kemp/appendixa.html#words**.

Block #6 - Place of Origin:
This is the name of the community, building, or agency where the originator of the message is located, whether a ham or not. This is not the location of the station that first handled the message, which is listed in Block 4, "Station of Origin."

Block #7 - Time Filed:
This is an optional field, unless handling instruction "Bravo" (HXB) is used. HXB means "cancel if not delivered within X hours of filing time." Unless the message is time sensitive, this field may be left blank for routine messages, but completing the time field is generally recommended for Welfare, Priority, and Emergency messages. Many hams use Universal Coordinated Time (UTC) for messages and logging. During emergencies, it is better to use local time and indicators such as PST or EDT to eliminate confusion by served agency personnel.

Block #8 - Date:
This is the date the message was first placed into the traffic system. Be sure to use the same date as the time zone indicated in Block 7.
Header Examples:
This is how a complete header might look for a CW or digital message:
NR207 P HXE W1FN 10 LEBANON NH 1200 EST JAN 4

This is how the same header would be spoken:
"Number two zero seven Priority HX Echo Whiskey One Foxtrot November One Zero Lebanon NH One Two Zero Zero EST January four."

A brief pause is made between each block to help the receiving station separate the information. Note that the title of each block is not spoken, with the exception of the word "number" at the beginning, which tells the receiving station that you are beginning the actual message.

Pro-Words and Pro-Signs:
When sending formal traffic, standard “prowords” or pro-signs” (CW) are used to begin or end parts of the message, and to ask for portions of the message to be repeated. In addition to adding clarity, the use of standard pro-words and pro-signs saves considerable time.

Some pro-words and pro-signs tell the receiving station what to expect next in the address, text, and signature portions of the message – they are *not* used while reading the header, since the header follows a predetermined format. Examples of commonly used pro-words are, “figures” sent before a group consisting of all numerals, “initial” to indicate that a single letter will follow, or “break” to signal the transition between the address and the text, and the text and the signature.

Message Handling Pro-Words, Prosigns And Abbreviations

Pro-Word (voice) -- Pro-Sign (on CW) Meanings or Example

BREAK --- BT * Separates address from text and text from signature.
CORRECTION --- HH * “I am going to correct an error.”
END --- AR * End of message.
MORE FOLLOWS --- B Additional messages to follow.
NO MORE – N No additional messages. In CW can also mean “negative” or “no”
FIGURES – (Not needed in CW) Used before a word group consisting of all numerals.
INITIAL --- (Not needed in CW) Used to indicate a single letter will follow.
I SAY AGAIN -- IMI* Used to indicate a repeat of a word or phrase will follow.
I SPELL – (Not needed in CW) “I am going to spell a word phonetically.”
LETTER GROUP – (Not needed in CW) Several letters together in a group will follow. Example: ARES, SCTN.
MIXED GROUP – (Not needed in CW) Letters and numbers combined in a group will follow. Example: 12BA6
X-RAY – X Used to indicate end of sentence, as with a “period.”
BREAK -- BK * Break; break-in; interrupt current transmission on CW
CORRECT -- C Correct, yes
CONFIRM – CFM Confirm (please check me on this)
THIS IS – DE* Used preceding identification of your station
HX – HX Handling instructions, single letter to follow—optional part of preamble
GO AHEAD – K Invitation for specific station to transmit
ROGER -- R Message understood. In CW, may be used for decimal point in context
WORD AFTER -- WA “Say again word after xxx.”
WORD BEFORE -- WB ‘ ‘Say again word before xxx.”
BETWEEN – BN ‘Say again all between xxx and yyyy”
ALL AFTER -- AA “Say again all after xxxx”
ALL BEFORE -- AB “Say again all before xxxx”
* Two letters are sent as one character.

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Sending a Message with Voice: When the receiving station is ready to copy, read the message at a pace that will allow the receiving station to write it down. Once you are done, if the receiving station has missed any portion of the message they will say, "say again all after____," "say all before," or "say again all between____ and ____." In some nets, the practice is to say "break" and then unkey between sections of the message so that a station can ask for missing words to be repeated before going on (these repeated words are also known as "fills"). In many nets the entire message is read first before any fills are requested, to save time. All numbers in groups are spoken individually, as in "three two one five," not "thirty-two fifteen," or "three thousand two hundred and five."

Here is the entire message as it would be spoken:
"Number two zero seven Priority HX Echo Whiskey One Foxtrot November
One Zero Lebanon NH one two zero zero EST January four
Mark Doe
Red Cross Disaster Office
Figures one two three Main Street
Rutland VT figures zero five seven zero one
Figures eight zero two five five five one two one two
Break
Need more cots and sanitation kits at all five shelters Break
Joan Smith Shelter Manager
End No more"

Time Savers

What NOT to say: When passing formal traffic, do not add unnecessary words. Since the parts of the header are always sent in the same order, there is no need to identify each of them. The only exception is the word "number" at the beginning of the header. Here is an example of how ***not*** to read the header of a message on the air:

"Number two zero seven precedence, Priority handling instructions, HX Echo station of origin W1FN check one zero place of origin, Lebanon NH time one two zero zero EST date, January 4 Going to Mark Doe Red Cross Disaster Office Address figures one two three Main Street Rutland VT, ZIP figures zero five seven zero one. Telephone Figures eight zero two five five five one two one two"
This example added many unneeded words to the message, including "station of origin," "check," "time," "going to," "address," "ZIP," and "telephone" and other block titles. If there is something about the message that deviates from the standard format, or if an inexperienced operator is copying the message without a pre-printed form, then some additional description may be necessary, but in most cases it just wastes time. (The pro-word "figures" is used correctly, and "number" is always spoken before the message number.)

Reference links:
For a **list of ARES and NTS nets** in your area, see the ARRL Net Directory at:
www.arrl.org/FandES/field/nets/

For a detailed discussion of the **FCC Rules on emergency and third party communications**, please see the ARRL *FCC Rule Book*, Chapter 5.

ARRL Precedence and Handling
Instructions: **www.arrl.org/FandES/field/pscm/sec2-ch6.htm**

ARES and NTS Forms: **www.arrl.org/FandES/field/forms**

FSD218 message handling information card,(also known as the "Pink Card"):
www.arrl.org/FandES/field/forms/#fsd218

Review:
Formal messages are more likely to be delivered intact than verbal comments. Using a standard format for formal messages makes it easier and faster for both sending and receiving stations to handle. Frequent practice with any formal message format is essential if you are to be able to use it accurately and quickly.

Basic Message Handling Part II

Objective: This unit is a continuation of the previous learning unit.
Student preparation required: No additional preparation is required.
Information:
Message Handling Rules

Do not speculate on anything relating to an emergency! There may be hundreds of people listening to what you say (other Amateurs, and the media and general public using scanners) and any incorrect information could cause serious problems for the served agency or others. You do not want to be the source of any rumor. If your served agency requests an estimate, you can provide that information as long as you make it very clear that it is only an estimate when you send it. For example, saying "The estimated number of homes damaged is twelve" would be acceptable.

***Pass messages exactly as written or spoken*:** In addition to speed, your job as a communicator is to deliver each message as accurately as possible. Therefore, you must not change any message as you handle it. If it is longer than you would like, you must send it anyway. Apparently misspelled words or confusing text must be sent exactly as received. Only the original author may make changes. If you note an inaccurate word count in a NTS format message, you must maintain the original count and follow it with the actual count received at your station, i.e.: “12/11.”

Should you return a message to the author before first sending it if it seems incorrect or confusing? This is a judgment call. If the apparent error will affect the meaning of the message and the author is easily contacted, it is probably a good idea. Whenever possible, it is a good practice to read each message carefully in the presence of the author before accepting it. This way, potential errors or misunderstandings can be corrected before the message is sent.

Non-Standard Format Messages: Much of the tactical information being passed during a major emergency will not be in ARRL format. It may have much of the same information, but will be in a non-standard format or no format at all. These messages should also be passed exactly as received. If necessary, use the ARRL format and place the entire non-standard message in the “text” section.

The Importance Of The Signature

During an emergency, the messages you handle can easily contain requests for expensive supplies that have a very limited “shelf life” (such as blood for a field hospital), or for agencies that will only respond to properly authorized requests (i.e.: for medevac helicopters). For this reason, it is critical that you include the signature and title of the sender in every message.

ARRL Numbered Radiograms

ARRL Numbered Radiograms are a standardized list of often-used phrases. Each phrase on the list is assigned a number. There are two groups: Group One is for emergency relief and consists of 26 phrases numbered consecutively from “ONE” to “TWENTY SIX,” and preceded by the letters “ARL.” For example, “ARL SIX” means “will contact you as soon as possible.”

Group Two contains 21 routine messages, including number “FORTY SIX” and from “FIFTY” through “SIXTY NINE.” Earlier printed versions of this list do not contain the latest additions. For the complete list, see **www.arrl.org/FandES/field/forms/fsd3.pdf**
In the text of the message, the numbered radiogram is inserted by using the letters “ARL” as one word, followed by the number written out in text, not numerals. For example: “ARL FIFTY SIX.”

When using numbered radiograms, the letters “ARL” are placed in the “check” block of the preamble, just prior to the number indicating the word count, as in “ARL7.” If the text contains “ARL FIFTY SIX”, it is counted as three words for the “check” block. Two common receiving errors are to write “ARL-56” and count it as one word, or “ARL 56” and count it as two words. Such would obviate the purpose of the check (word count).

It is important to spell out the numbers letter by letter when sending using voice. This allows the receiving station to correctly copy what is being sent, and not inadvertently write the figures out as “FIVE SIX” instead of “FIFTY SIX.” Some numbered messages require a “fill in the blank” word in order to make sense. Here are two examples: ARL SIXTY TWO: Greetings and best wishes to you for a pleasant ______ holiday season.

ARL SIXTY FOUR: Arrived safely at ______.

Here’s an example of a message to convey a Christmas greeting, indicate safe arrival and send regards from family members.

57 R W1AW ARL 16 PUEBLO CO DECEMBER 10
RICHARD RYAN
3820 S SUNNYRIDGE LANE
NEW BERLIN WISCONSIN 53151
414 555 1234
BREAK
ARL FIFTY ARL SIXTY TWO CHRISTMAS
ARL SIXTY FOUR HOME
MOM AND DAD SEND THEIR LOVE
BREAK
BOB AND ALICE

Note that no “XRAY” is used between parts of this message. The numbered radiogram assumes a period at the end of the phrase.

Important: Be sure to decode a message containing an ARL text into plain language before delivering it. Chances are good that the recipient will not know the meaning of the ARL code number. In one real situation, a recipient thought that an un-decoded ARL radiogram delivered by telephone was actually a spy message, and contacted the FBI.

Copying Hints

When copying the text of a message by hand, receiving stations should write five words on each line, (or ten words per line if using a keyboard). The standard ARRL Radiogram form is set up for hand copying with spaces for each word, but even if you are writing on whatever happens to be handy, grouping the words five to a line allows for a very quick count after the message is received. Once complete, the receiving operator compares the word count with the check. If okay, the message is “rogered” – if not, the message is repeated at a faster reading speed to locate the missing or extra words.

Modified Message Form for Disasters

While ARRL format messages can handle many different types of information flow, there can be requirements for formats that are unique to an individual agency or type of emergency. Your EmComm group should work with each served agency before the emergency to see which format will best fulfill their needs. A good example is the popular Incident Command System (ICS) form ICS-213 used by most government agencies.

Service Messages

A "service message" is one that lets the originating station know the status of a message they have sent. A service message may be requested by a handling instruction (HX), or may be sent by any operator who has a problem delivering an important message. During emergencies, service messages should only be sent for Priority and Emergency messages.

Logging and Record Keeping

An accurate record of formal messages handled and various aspects of your station's operation can be very useful, and is required by law in some cases. Lost or misdirected messages can be tracked down later on, and a critique of the operation afterward can be more accurate. All logs should include enough detail to be meaningful later on, especially the date and an accurate time. With some agencies, your log becomes a legal document and may be needed at some later time should an investigation occur. In this case, logs should be completed and turned in to the appropriate person for safekeeping and review.

What to Log: Log all incoming and outgoing messages. Record the name of the sender, addressee, the station that passed the message to you, the station to whom the message was sent, the message number, and the times in and out. Keep the written copy of each message in numerical order for future reference. Also, log which operators are on duty for any given period, and record any significant events at your station. These might include changes in conditions, power failures, meals, new arrivals and departures, equipment failures, and so on.

In addition to the log, copies of all messages should be kept and catalogued for easy retrieval if needed later for clarification or message tracking. Many operators make notes about when the message was received and sent, and to and from whom, directly on the message form itself. This helps speed up tracking later on. Never rely on your memory.

Should informal messages be logged? This is usually up to the stations involved, and depends on the circumstances. Even informal messages can contain important details that may need to be recalled later. Emergency or Priority messages of any kind, even unwritten messages, should always be logged. Some net control operators like to log every message or exchange, no matter how inconsequential. Others like to log only those with potentially important details.

Log Formats: At a station with little traffic, all information can be included in one chronological log. However, if a large number of messages are being handled and you have a second person to handle logging, separate logs can make it faster and easier to locate information if it is needed later. You might keep one log for incoming messages, one for outgoing messages, and a third for station activities. The NCS will also need to keep a log of which operators are assigned to each station, and the times they go on and off duty.

Who should log: At the net level, logging can be handled in several ways. If activity is low, the net control operator can handle logging. In busy nets, a second person can keep the log as the net's "secretary" and act as a "second set of ears" for the NCS. The logger can be at the NCS, or they might be listening from a different location. If an "alternate NCS" station has been appointed, they should keep a duplicate log. If they need to "take over" the net at any point, all the information will be at hand, preserving the continuity of the net.

In addition to logs kept at the net level, each individual operator should keep their own log.This will allow faster message tracking and provides duplicate information should one station's logs become lost or damaged. In a fast moving tactical net, keeping a log while on the move may be impossible for individual stations. In this case, the net control station may decide to keep one log detailing the various informal messages passed on the network. Logging is a good position for a trainee with limited experience, or an unlicensed volunteer. Two experienced and licensed operators can also alternate between on-air and logging duties to help combat fatigue.

Writing Techniques for Message Copying and Logging

Your logs should be clear and legible to be of any use. If only you can read your handwriting, the log will be of little value to the operator who takes the next shift or to the served agency as a legal document. Print in neat block letters on lined paper or a pre-printed log form. A firm writing surface with support for your forearm will reduce fatigue and improve legibility.

Keep both pens and pencils on hand since each works better under different conditions. Logs that will become legal documents should always be written in permanent ink. Some operators prefer special "diver's" pens that will write on wet surfaces at any angle.

Logs should be kept in notebooks to prevent\ pages from becoming lost. In the case of preprinted log sheets, use a three-ring binder. If more than one log is kept, each should be in its own notebook to prevent confusion and accidental entries. Logs that will become legal documents should be kept in hard-bound books with pre-numbered pages so that missing pages will be obvious.

In fast-moving situations, it can be difficult or impossible to keep a log of any kind. If a message, exchange, or event should be logged, try to do it as soon as possible afterwards, or ask the NCS to add it as a notation in his log. If there are enough operators to do so, one may be assigned the sole task of logging the net's operations, thus freeing up other net participants to handle messages more quickly.

Message Authoring – Them Or Us?

One of the oldest arguments in EmComm is the question of whether or not EmComm personnel should author (create) agency-related official messages. If your job is strictly communication, and the message is not about the communication function you are providing, the best answer is "no." "Pure" communicators are not generally in a position to create messages on behalf of the served agency. They have no direct authority and usually lack necessary knowledge.

However, you should always work with a message's author to create text that is clear, to the point, and uses the minimum number of words necessary. Once you do this with most agency personnel, they will be happy to send you appropriate messages, since it saves them time, too. If the author tells you to "just take care of the wording for me," it is still a good idea to get their final approval and signature before sending the message.
If you have additional training for an agency specific job that involves message origination, this is quite different from the situation of a "pure" communicator. In this case, you may be able to generate an official message if you have been given the authority to do so.

Other messages that can and should be generated by all EmComm operators are those that deal solely with communication. Examples would be messages about net operations and frequencies, and requests for relief operators, radio equipment, supplies, food, and water for EmComm personnel.

Message Security & Privacy

Information transmitted over Amateur Radio can never be totally secure, since FCC rules strictly prohibit us from using any code designed to obscure a message's actual meaning. Anyone listening in with a scanner can hear all that is said on voice nets. The federal Communications Privacy Act does not protect Amateur Radio communications, and anything overheard may be legally revealed or discussed. Reporters in disaster-prone areas have been known to purchase digital-mode decoding software for laptops in order to intercept ham radio communications during disasters.

However, this does not mean that you can discuss any message you send with others. Messages sent via Amateur Radio should be treated as privileged information, and revealed only to those directly involved with sending, handling, or receiving the message. This must be done to offer at least a minimum level of message security. You cannot prevent anyone from listening on a scanner, but you can be sure they do not get the information directly from you.

Your served agency should be made of aware of this issue, and must decide which types of messages can be sent via Amateur Radio, and using which modes. The American Red Cross has strict rules already in place. In general, any message with personally identifiable information about clients of the served agency should be avoided – this is a good policy to follow with any agency if you are in doubt. Messages relating to the death of any specific person should never be sent via Amateur Radio. Sensitive messages should be sent using telephone, landline fax, courier, or a secure served-agency radio or data circuit.

While we can never guarantee that a message will not be overheard, there are ways to reduce the likelihood of casual listeners picking up your transmissions.

Here are some ideas:
Use a digital mode: packet, PSK31, fax, RTTY, AMTOR, digital phone, etc.
Pick an uncommon frequency – stay off regular packet nodes or simplex channels.
Do not discuss frequencies or modes to be used openly on voice channels.
Avoid publishing certain ARES or RACES net frequencies on web sites or in any public document.

Some agencies use a system of "fill in the blank" data gathering forms with numbered lines. To save time on the radio, all that is sent is the line number and its contents. A casual listener might hear, "Line 1, 23; line 5, 20%; line 7, zero." The receiving station is just filling in the numbered lines on an identical form. Without the form, a casual listener will not have any real information. As long as encryption is not the primary intent, this practice should not violate FCC rules.

Informal Messages

When we send a written ARRL-format message, we do it to preserve accuracy no matter how many people pass the message along.

Informal or "tactical" messages are not written out in ARRL format, or not written at all. However, this does not mean that accuracy is any less important. If someone gives you a short message to relay to someone else, you should repeat it as closely to the original as possible. Messages that will be relayed more than once should always be sent in ARRL format to prevent multiple modifications.

Here is an example of what might happen if you are not careful to maintain the precise meaning of the original message:
The original message: "The shelter manager says she needs fifty cots and blankets at Hartley Hill School by tonight."
After being passed through several people: "He says they need a bunch more cots and blankets at that school on the hill."

Best operating procedures is for the transmitting station to hand the originator the microphone while the receiving station gives the designator the microphone directly whenever possible to acknowledge receipt of the message; thus obviating the need of a third party relay altogether.

Reference links
ARRL F&ES – Appendix A – Originating Messages **www.arrl.org/FandES/ead/teacher/kemp/appendixa.html**
American Red Cross Disaster Welfare Inquiry intake forms **www.arrl.org/FandES/field/forms/**

Review:
In this unit you learned how to format, send, and receive a formal ARRL style message, and the importance of the signature, logging, and accuracy. Formal message formats make message handling more efficient and accurate. Not every situation requires a formal message, but where the accuracy of specific information is critical, the formal message is the best method.

Amateur Radio is not a secure mode, but you can take other steps to protect messages. You should never discuss the contents of messages with anyone else.
Officials of a served agency normally originate messages, but if you have additional training in a job for your served agency, you may also be authorized to originate messages.
Whenever possible, you should work with a message's author to create a clear text using the minimum number of words necessary.

Student Activities:
1. Create a formal ARRL style message using an ARL numbered radiogram text. Be sure the word count is correct.
2. Assume that you are helping a served agency staffer condense a lengthy message. Edit the following message text to reduce the number of words to a minimum, without losing any clarity.
"We need 50 additional cots and blankets at the Roe School shelter, and we also need more food since 20 new people just arrived and we are told another 30 may be coming soon. Please call me and tell me when these supplies will arrive."

Go to the ARRL website and look up ARRL Numbered Radiograms: **www.arrl.org/FandS/field/forms/fsd3.pdf**

When you have located the list of Numbered Radiograms, answer the questions that follow.

More Net Operating Guidelines

Information:

Every organization needs an executive-level manager to oversee the entire operation and ensure that everything runs smoothly. Depending on the type of net, the Net Manager will be responsible for recruiting and training NCS operators, liaison stations and other net members. The Net Manager sets up the net's schedule and makes sure that one or more qualified NCS operators will be available for each session of the net. In a long-term emergency net, the Net Manager may also arrange for relief operators and support services. Some net managers may be responsible for more than one net.

The NCS

Think of the NCS as a "ringmaster" or "traffic cop." The NCS decides what happens in the net, and when. If the EOC has a Priority message for Red Cross Shelter 1, and Medical Station 4 has an Emergency message for Mercy Hospital, it is the NCS's job to make sure that the Emergency message is sent first. He decides when stations will check in, with or without traffic, and whether messages will be passed on the net's frequency or a different one. The NCS needs to be aware of everything going on around him and handle the needs of the net, its members and served agency as quickly and efficiently as possible. It can be a daunting task in a busy and challenging net.

The NCS can be located anywhere, but should be in a position to hear most, if not all, stations in the net. This helps avoid time-consuming relays.

Objective: This unit will help net members understand how to operate efficiently and effectively in a net environment under emergency conditions.

Some groups place their NCS at the EOC or command post, others like to keep them away from the noise and confusion. The NCS is in charge of one specific net, but should not be responsible for the entire EmComm operation. That is the job of the EC or similar EmComm manager. It is not possible to be in command of all aspects of an emergency response, and still run a net effectively, since both jobs require 100% of your attention.

Net Scripts

Many groups open and close their nets with a standard script. The text of the script lets listeners know the purpose and format of the net. Using a standard script also ensures that the net will be run in a similar format each time it operates, regardless of who is acting as the NCS. A typical net script might look like this:

Opening: *This is [call sign], net control station for the New Hampshire ARES/RACES Emergency Net. This is a directed emergency net for liaison stations from all New Hampshire ARES/RACES regions. Please transmit only when requested to, unless you have emergency traffic. Any station with emergency traffic, please call now. (Stations call in and emergency traffic is passed.) Any station with priority traffic,*

please call now. (Stations call in and priority traffic is passed.) All other stations with or without traffic, please call now. (Stations call in and any traffic is passed.)
Closing: *I would like to thank all stations that checked in. This is [call sign] securing the New Hampshire ARES/RACES Emergency Net at [date and time] returning the [repeater or frequency] to regular use.*

The Backup NCS

A **backup NCS** needs to be readily available should there be an equipment failure at the **primary NCS** location, or if the primary NCS operator needs to take a break. There are two types of backup NCS. Either the Net Manager or the primary NCS, depending on the situation, appoints both. All members of the net should be made aware of the backup NCS assignment early in the net's operation. The first type is at the same location as the primary NCS operator. The second is a station at a different location that maintains a duplicate log of everything happening during the net. Whenever possible, an offsite backup NCS should be maintained, even if an on-site backup is present. This is especially important during an emergency where antennas can be damaged or power lost. Equipment can fail even during less demanding operations.

Acting as a "fill-in" NCS

Even before you have had a chance to be trained by your group to act as a NCS operator, an opportunity might arise for you handle the job temporarily. During an emergency, anyone and everyone can be asked to take on new and unfamiliar tasks in order to deal with a rapidly changing situation. Fortunately, basic NCS skills
are not difficult to teach or learn. Here are some basic dos and don'ts:
Remember that although you are in control of the net, you are not "God." Treat members with respect and accept suggestions from other experienced members.
If you are taking over an existing net, try to run it much as the previous NCS did.
Always follow a script if one is provided. Write your own if necessary, but keep it short and to the point.

Handle messages in order of precedence:
Emergency –– Priority (P) – Welfare (W). Routine messages are not handled..
Speak clearly and in a normal tone of voice.
Use good mic technique.
Make all instructions clear and concise, using
as few words as possible.
Keep notes as you go along. Do not let your log fall behind.
Write down which operators are at which locations. When one leaves or is replaced, update your notes.

Ask stations to pass messages off the main net frequency whenever possible.

All the reading and study in the world will not replace actual experience. You should look for opportunities to practice being the NCS operator well before an emergency occurs.

Net Members

Operators at various sites are responsible for messages going to and from their location. They must listen to everything that happens on the net, and maintain contact with the served agency's people at the site. They assist the served agency with the creation of messages, put them into the appropriate format and contact the NCS when they are ready to be sent.

Whenever possible, two operators should be at each site. When the station is busy, one can handle logging, message origination, and work with the served agency's staff while the other monitors the net, sends messages, and copies incoming traffic. During slower periods, one member can be "off-duty" for rest, meals or personal needs.

Liaison Stations

Liaison stations pass messages between two different nets. The NCS or Net Manager, depending on the type of organization, usually assigns these stations. Messages may be passed as needed, or on a pre-set schedule. In some cases, a liaison station will monitor one net full time.

When a message must be passed to another net, they leave the net temporarily to pass it, and then return. The other net has a liaison station who does exactly the same thing, but in reverse.

In other situations, a single liaison station may need to handle messages going both ways between two nets. There are two ways to do this. You can use two radios to monitor both nets at the same time, a difficult task if either or both nets are busy. The radios antennas must be separated sufficiently to prevent interference between radios when one is used to transmit. In the second method, one radio is used, and the liaison station switches between the two nets on a regular schedule.

Relay Stations

While not a regular net position, a relay station is one that passes messages between two stations in the net that cannot hear each other. Relay stations are generally designated by the NCS on an "as needed" basis. If you can hear a station or stations that the NCS cannot, it is OK to volunteer to act as a relay station.

Workload and Shift Changes

Although it happens frequently, no operator should try to work excessively long hours. When you become tired, your efficiency and effectiveness decline, and your served agency is not getting the best possible service. Net managers and NCS operators should work with the EC or other EmComm manager to ensure that all net members get some rest on a regular basis.
It is a good practice for any replacement NCS, liaison, or net member to monitor the net for at least fifteen minutes and review the logs with the present operator before taking over. This assures continuity in the net's operation.

Non-voice Modes

Packet modes include FM packet, HF packet and PACTOR. Because packet modes can provide an automatic connection between two stations, it is not really proper to speak of a "packet net."
Although messages can be transmitted between two stations "keyboard to keyboard" as with RTTY or PSK31, it is usually better to transmit them as "traffic," using the bulletin board or mailbox facility of the terminal node controller (TNC). Packet messages are automatically routed and stored without any action by the receiving station's operator or a NCS.

Non-packet digital modes are not automatic,and may require a NCS operator to manage the net in much the same way as a phone or CW net. These include RTTY, PSK31, AMTOR and GTOR.

CW Procedures: Clean and accurate code sent at 10 words per minute is better than sloppy code sent at 30 words per minute. Sending speed is not a true measure of effectiveness, but accuracy is. When propagation or interference makes communication difficult, or when the receiving operator cannot keep up, it is time to reduce the sending speed. Always send at a speed that the receiving station can copy comfortably.

There are variations used when passing traffic via CW, especially when both stations are operating "full break-in"mode (both stations are capable of receiving signals between each Morse character sent). The receiving station can "break" (stop) the sending station at any point for needed fills, instead of waiting for the entire message to
be sent. There are additional special pro-signs used, and interested Amateurs should be familiar with ARRL Publication FSD-218
HYPERLINK "http://www.arrl.org/files/file/Public%20Service/fsd218.pdf" http://www.arrl.org/files/file/Public%20Service/fsd218.pdf
This publication is sometimes referred to as the "pink card" and contains CW net procedures as well as a description of the Amateur Message Form, message precedences and Handling Instruction abbreviations.

Procedure Signals (Prosigns) for Morse Code
BK Invite receiving station to transmit (break)

CL Going off the air (clear)
CQ Calling any station (literally, Come Quick)
K Go, invite any station to transmit
R All received OK
AA (Separation between parts of address or signature)
AR Over, end of message
AS Please stand by
BT Separation (break) between address and text; between text and signature
KN ‘X’ Go only, invite a specific station ‘X’ to transmit
SK End of contact (send before sending your call)

Abbreviations
Fill Term used to describe missing items (words, characters, numbers etc.) when handling messages in the National Traffic System.
AA All after (use to get fills)
AB All before (use to get fills)
ADEE Addressee (name of the person to whom the message is addressed)
ARL (Used with “check”—indicates use of ARL numbered message in text.)
BN Between
SIG Signed; signature (last part of message)
WA Word after
WB Word before
When formatting an ARRL Radiogram message, use abbreviations and prosigns consistently and appropriately. For instance, do not send “R,” meaning you have received everything correctly, and then ask for repeats like “AA” (all after) or “AB” (all before).

Interference Problems
If your net experiences interference, the NCS has several options. If the interference is coming from adjacent or co-channel stations who may be unaware of the emergency net, the NCS should politely inform them of the net and ask for their cooperation. Alternatively, the NCS might ask an HF net to move over a few kHz. If the problem cannot be resolved in this manner, each net should have one or more alternative frequencies that it can move to as required. If possible, the frequencies themselves should not be published or mentioned on the air.

Never discuss, acknowledge or try to speak with an intentionally interfering station. Many years of experience has proven that this only encourages the offender. If the interference is making communication difficult, simply announce to the net that everyone should move to the alternate frequency and sign off. Better yet, put a plan in place so that when interference occurs, all net members know to move to the alternate frequency without being told to do so on the air. If intentional interference persists, the Net Manager or NCS can contact an elected League official or an Official Observer Station, and ask that the FCC be notified of the interference. In some cases, they may be able to track down and contact the responsible station.

Reference links:
For information about **ARRL Public Service Communications**, please see *The ARRL Public Service Communications Manual:* **www.arrl.org/FandES/field/pscm/index.html**
ARRL Publication FSD-218: **www.arrl.org/FandES/field/forms/fsd218.pdf**.

Review: As the net's "ringmaster," the NCS operator is responsible for keeping the net operating smoothly and assuring that messages are sent in order of priority. An off-site backup or alternate NCS operator is essential for long running nets in the event of equipment failure or operator fatigue.

Net member stations should monitor the net continuously whenever possible, as well as maintaining contact with the served agency's staff at that location. Liaison stations pass traffic between two different nets, sometimes only in one direction, and sometimes in both directions.

Bulletin stations transmit bulletin messages from the served agency to the net. CW nets can move messages very quickly and accurately, but slightly different procedures are used than with phone. Packet radio doesn't use a conventional net format due to its automatic nature, and is well suited to handling large volumes of traffic, or highly detailed and lengthy messages.